SCIENCE AND TECHNOLOGY ORGANIZATION
CENTRE FOR MARITIME RESEARCH AND EXPERIMENTATION

**Conference Proceedings** **CMRE-CP-2017-001**

# Conference Proceedings of the Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference

Raúl Vicen-Bueno, Emanuel Coelho, Giuliana Pennucci

January 2019

# About CMRE

The Centre for Maritime Research and Experimentation (CMRE) is a world-class NATO scientific research and experimentation facility located in La Spezia, Italy.

The CMRE was established by the North Atlantic Council on 1 July 2012 as part of the NATO Science & Technology Organization. The CMRE and its predecessors have served NATO for over 50 years as the SACLANT Anti-Submarine Warfare Centre, SACLANT Undersea Research Centre, NATO Undersea Research Centre (NURC) and now as part of the Science & Technology Organization.

CMRE conducts state-of-the-art scientific research and experimentation ranging from concept development to prototype demonstration in an operational environment and has produced leaders in ocean science, modelling and simulation, acoustics and other disciplines, as well as producing critical results and understanding that have been built into the operational concepts of NATO and the nations.

CMRE conducts hands-on scientific and engineering research for the direct benefit of its NATO Customers. It operates two research vessels that enable science and technology solutions to be explored and exploited at sea. The largest of these vessels, the NRV Alliance, is a global class vessel that is acoustically extremely quiet.

CMRE is a leading example of enabling nations to work more effectively and efficiently together by prioritizing national needs, focusing on research and technology challenges, both in and out of the maritime environment, through the collective Power of its world-class scientists, engineers, and specialized laboratories in collaboration with the many partners in and out of the scientific domain.

CMRE-CP-2017-001

# Conference Proceedings of the Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference

Raúl Vicen-Bueno, Emanuel Coelho, Giuliana Pennucci

This document, which describes work performed under the Project/the Programme SAC000706 (EKOE 1 - Maritime Autonomous Networks and Smart Sensing for Stealth and Secure Battlespace Characterization) of the STO-CMRE Programme of Work, has been approved by the Director.

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CMRE-CP-2017-001

**Conference Proceedings of the Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference**

Raúl Vicen-Bueno, Emanuel Coelho, Giuliana Pennucci

**Executive Summary:** NATO STO CMRE hosted the Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference on 2-4 October 2017. Its overarching objective was to bring together personnel from the military, civilian, industry and research communities to discuss and identify environmental risks, planning shortfalls and ways-ahead to assist decision makers and to improve effectiveness in military and civilian operations. Specific objectives and topics of interest of the DeSRA 2017 Conference were: Recognized Environmental Picture (REP) and Risk Assessment; Environmental Information Flow for Decision Support and Command and Control (C2); Maritime Intelligence, Surveillance and Reconnaissance (MISR); and Operational Experimentation (OPEX) Opportunities.

A total of 2 NATO bodies: ACO/SHAPE and STO CMRE, and 20 institutions/organizations from 13 NATO and Partner nations: 1 CAN, 2 DEU, 1 DNK, 2 ESP, 4 FRA, 2 GBR, 4 ITA, 1 NLD, 1 NOR, 1 NZL, 1 USA participated in this NATO STO CMRE-lead conference. Institutions/organizations, such as, ACO/SHAPE with a keynote speech, and, DRDC, 1GNC, MUKdo, FCOO, GRADIANT, DEIMOS, MINES ParisTech, DGA, RCF, THALES, Dstl, NOC, CNR-ISMAR, IHI, MARICOSOM, dAD, NOBLE, MOS, and Teledyne made important contributions in the conference. Relevant inputs were provided by the participants into all the topics of DeSRA 2017. All this made possible to establish collaborations and projects among some of them.

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**Conference Proceedings of the Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference**

Raúl Vicen-Bueno, Emanuel Coelho, Giuliana Pennucci

**Abstract**: The Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference Proceedings contain the peer-reviewed abstracts accepted for this conference. The DeSRA 2017 Conference took place at the NATO STO CMRE facilities in La Spezia, Italy, on 2-4 October 2017. Its overarching objective was to bring together personnel from the military, civilian, industry and research communities to discuss and identify environmental risks, planning shortfalls and ways-ahead to assist decision makers and improve operational effectiveness. These Conference Proceedings contain a total of 27 abstracts covering all the topics of the conference, such as: Recognized Environmental Picture (REP) and Risk Assessment; Environmental Information Flow for Decision Support and Command and Control (C2); Maritime Intelligence, Surveillance and Reconnaissance (MISR); and Operational Experimentation (OPEX) Opportunities.

Researchers and industry were exposed to real challenges faced in operations from the military and civilian organizations/institutions participating. Besides the speakers of the 27 Abstracts published in these proceedings, additional military and civilian personnel attended the DeSRA 2017 Conference to learn about state-of-the-art techniques and systems on the topics of the conference. They also had the opportunity to make contributions and influence the development of these techniques and systems. A total of 2 NATO bodies: ACO/SHAPE and STO CMRE, and 20 institutions/organizations from 13 NATO and Partner nations: 1 CAN, 2 DEU, 1 DNK, 2 ESP, 4 FRA, 2 GBR, 4 ITA, 1 NLD, 1 NOR, 1 NZL, 1 USA, participated in this NATO STO CMRE-lead conference. Details of the contributions made by the participants are incorporated in the Abstracts provided in these DeSRA 2017 Conference Proceedings.

**Keywords:** DeSRA; Decision support; Risk assessment; Operational effectiveness; Conference; Proceedings; REP; NATO; Command and Control; ISR; Intelligence; Surveillance, Reconnaissance; Interoperability; Experimentation.

# Contents

# 1 DeSRA 2017 Conference: Focus on R&D NATO and Partner nations interests

## 1.1 Background: Evolution of the DeSRA Conference

The Decision Support and Risk Assessment (DeSRA) initiative was born at NATO STO Centre for Maritime Research and Experimentation (CMRE) in 2014 with the *Decision Support and Risk Assessment for Asset Planning* (*DeSRAAP*) *2014 Workshop*. A limited number of participants was invited to this workshop, focusing on military objectives. More information could be found in its official website [1]:

http://www.cmre.nato.int/desraap-2014

A NATO STO CMRE Memorandum Report on the outcomes of the DeSRAAP 2014 Workshop was delivered on 2015 [2].

Next year, in 2015, this initiative increased in number of participants, as well as extended not only to military applications, but also to civilian ones. Objectives, participants, and other relevant information of the *Decision Support and Risk Assessment for Asset Planning* (*DeSRAAP*) *2015 Workshop* could be found in its official website [3]:

http://www.cmre.nato.int/desraap-2015

Due to the increase in number of participants, in 2016 this initiative became a full conference, focusing on many different topics related to decision support and risk assessment in maritime operations. It changed its name and acronym to *Decision Support and Risk Assessment for Asset Planning* (*DeSRA*). Objectives, participants, and other relevant information of the *DeSRA 2016 Conference* could be found in its official website [4]:

http://www.cmre.nato.int/desra-2016-conference

The conference proceedings of the *DeSRA 2016 Conference* are provided in [5].

## 1.2 Dates, location, logo and website

The *Decision Support and Risk Assessment for Operational Effectiveness* (*DeSRA*) 2017 Conference took place at NATO STO CMRE facilities on 2-4 October 2017.

The official logo of the DeSRA 2017 Conference is given in Figure 1.


Figure 1: Official logo of the DeSRA 2017 Conference.

The official URL/website of the DeSRA 2017 Conference is [6]:

http://www.cmre.nato.int/desra-2017-conference

A screenshot of the home of the official DeSRA 2017 Conference website as of November 1st, 2017, is given in Figure 2.

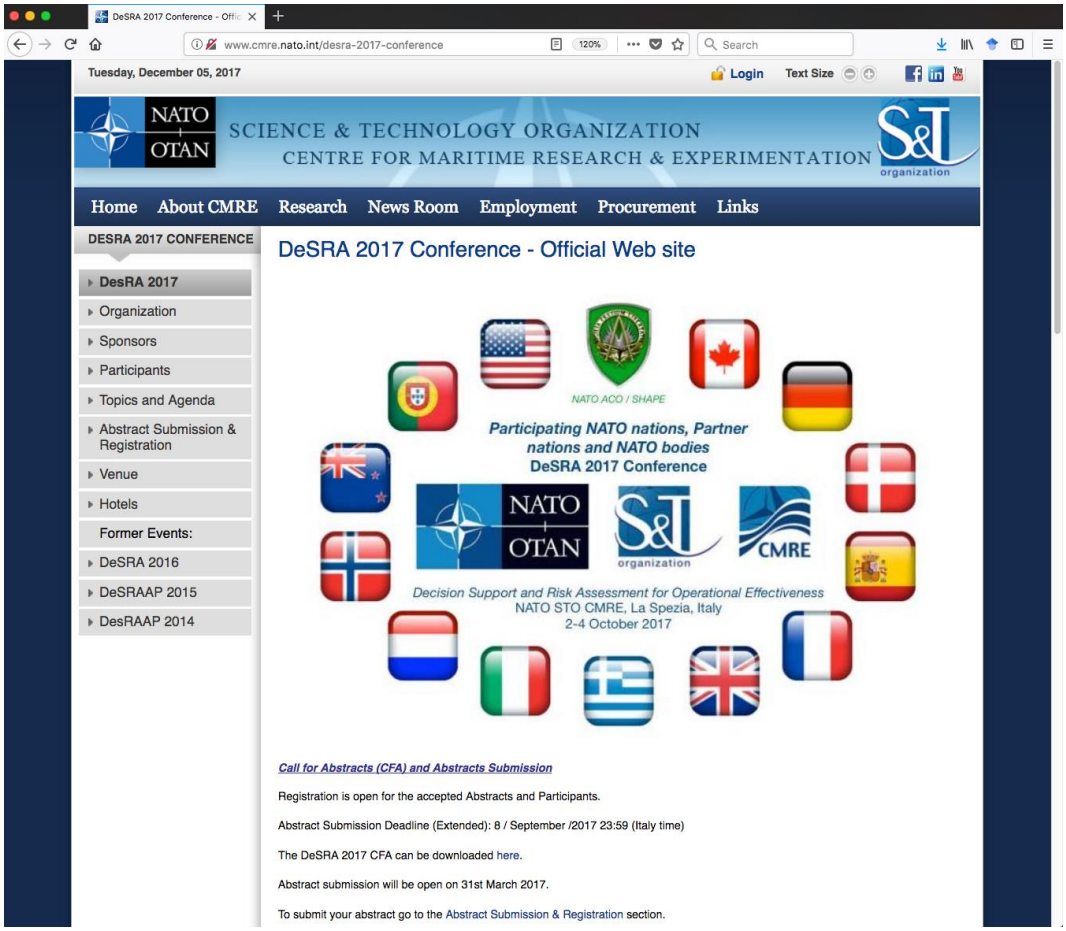


Figure 2: Screenshot of the DeSRA 2017 Conference website as of November 1st, 2017.

## 1.3 Overview

The environment is a major operational constraint in the maritime domain. The effectiveness of operations and the command and control (C2) of assets require understanding the environment as a whole, including:

- Physical factors, such as the meteorological and oceanographic (METOC) conditions, that determine when and where resources/assets can efficiently run operations.

- Social/economical/political factors, such as the border activity, ecological and industrial pressure, amount of vessel traffic or fishing activity through an area of interest, that constrain how resources/assets can efficiently run operations.

NATO STO CMRE is hosting the DeSRA 2017 Conference to discuss these factors and their impact on civilian and military operations and infrastructures, in ports, near-shore (shallow waters) or at open sea/ocean (deep waters). These impacts could be described through Risk Analysis/Assessment and included in the Decision-Making process along with other relevant criteria for mission optimization and C2 of assets. For this purpose, the DeSRA 2017 Conference will bring together scientists, operators and subject matter experts (SMEs) on scientific and operational topics such as environmental prediction and risk analysis/assessment strategies, which would potentially lead to inputs into the NATO Recognized Environmental Picture (REP), Environmental Functional Services (EnvFS), C2 strategies and other potential Decision Support frameworks. Topic discussions will also include information flow for decision support, Intelligence Surveillance and Reconnaissance (ISR) and operational experimentation, including approaches for validation and verification (V&V).

Military and civilian personnel, researchers and industry developers working on any of these areas or related fields are welcome to participate.

## 1.4 Objectives and Topics

The overarching objective of the DeSRA 2017 Conference is to bring together military and civilian personnel, industry and research communities to discuss and identify environmental risks, planning shortfalls and ways-ahead to assist decision makers and improve operational effectiveness. Researchers and industry will be exposed to real challenges faced in operations. Military and civilian personnel will learn about state-of-the-art techniques and systems on the topics of the conference and have the opportunity to influence their development.

Specific objectives and topics of interest of the DeSRA 2017 Conference are:

1. Recognized Environmental Picture (REP) and Risk Assessment

   NATO recently approved the REP concept. Risk assessment is crucial in operations and is linked to the REP by using information layers as inputs. Forecasts of the operational risks can be done through the forecast of the environment, where models play an important role. This conference aims at

presenting and discussing the ambitions of this REP framework and its impact in risk assessment strategies, identifying major shortfalls and outlining possible joint collaborations.

2. Environmental Information Flow for Decision Support and Command and Control (C2)

   Different phases are needed to properly support the decision-making and its effects. These phases could be summarized as: Connecting, Collecting (Sensing and Processing), Decision-making (Sense-making and Deciding), and Effecting. Each of these phases could lead operations to different stages of superiority, such as: Cyberspace, Data, Information, Knowledge, Decision and Execution, respectively. This conference aims at bringing SMEs on each of these phases to find solutions to improve these superiority stages.

3. Maritime Intelligence, Surveillance and Reconnaissance (MISR)

   Environmental inputs to sustain ISR operations is becoming more and more important in NATO and EU. The maritime domain is one of the key geo-strategic elements for NATO and EU. Executing ISR operations at sea (land and air as well) requires different steps that have to be coordinated, such as Task (of assets), Collect (by assets), Process, Exploit and Disseminate. This conference plans to bring SMEs on both ISR in general, and on each of its steps in particular, to find joint solutions working in a coalition.

4. Operational Experimentation (OPEX) Opportunities

   Development of concepts, technologies, capabilities, etc. requires experimentation for different purposes, such as proof-of-concept or demonstration of capability maturity. The future NATO Environmental Functional Services (EnvFS) could be considered as an example. The aim of most of the experimental capabilities being developed is to turn into operational. To reach this stage, Validation and Verification (V&V) is needed. At this point operational experimentation turns into a key element in the final stages of capabilities. SMEs on operational experimentation from NATO nations to present and discuss current efforts on this topic are expected to attend this conference.

## 1.5 Expected outcomes

The DeSRA 2017 Conference will be a forum for discussion about key aspects of decision support and risk assessment/analysis and its impact in NATO and EU. The main output of the conference will be a CMRE report containing the conference proceedings, which will be made available online on the DeSRA2017 Conference web site. Additional expected outcomes will be focused on strategies to contribute to the C2, REP and EnvFS concepts, and on inputs for fine-tuning research programmes to better support national and NATO risk assessment and decision support services. Specific outcomes could turn into exploitation of Joint Research Projects with participants, or the development of

consortia for future research projects, such as EU H2020, national program project calls, and/or multi-national NATO projects.

## 1.6 Additional information

Participants from the military, government, research, academia and industry communities are welcome to the DeSRA 2017 Conference, and may either:

- Attend and contribute: by providing a short abstract (no more than 200 words) and giving a short presentation (10 minutes) about one of the stated objectives/topics of the conference, and providing a summary of intent for participation (background and expected outcome).

- Only attend: by providing a summary of intent for participation (background and expected outcome).

Abstracts will appear on-line on the DeSRA 2017 Conference web site and will form part of the DeSRA 2017 Conference Proceedings (unless specified the opposite).

Attendance is limited to the nationals of the 28 member countries of NATO, as well as Australia, Austria, Finland, New Zealand, Sweden and Switzerland. The meeting will be held at NATO UNCLASSIFIED security level.

The number of participants is limited. Participation will be confirmed once an abstract and/or a summary of intent has been submitted and accepted. Registration and participation have no fee.

The number of participants is limited. Participation will be confirmed once an abstract and/or a summary of intent has been submitted and accepted. Further details about Abstract Submission and Registration can be found in its dedicated Section.

# 2 DeSRA 2017 Conference: Agenda and Participants

## 2.1 Agenda

*Decision Support and Risk Assessment for Operational Effectiveness* (**DeSRA**) **2017 Conference** - AGENDA

Agenda
Version 04
02-Oct-17

***D**ecision **S**upport and **R**isk **A**ssessment for Operational Effectiveness **2017 Conference***

**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Monday, October 2nd, 2017***

| | Time | Brief title | Speaker | Institution | Nation |
|---|---|---|---|---|---|
| | 08:30 | *Registration / Check-in* | **Mrs Felicita DI STEFANO** | NATO STO CMRE | ITA |
| Session 1: *CMRE, EKOE/MISR* | 09:00 | *DeSRA 2017 Conference: Welcome, Agenda, Administrative remarks, Round of participant presentations* | **Dr Raúl VICEN**<br>**Dr Emanuel F. COELHO**<br>**Mrs Giuliana PENNUCCI**<br>**All participants** | NATO STO CMRE<br>NATO STO CMRE<br>NATO STO CMRE | ESP<br>PRT<br>ITA |
| | 09:30 | *Institutional welcome to NATO STO CMRE* | **Dr. Alain MAGUER**<br>**Cdr DEU-N Stefan WITTWER** | NATO STO CMRE<br>NATO STO CMRE | FRA<br>DEU |
| | 09:45 | *NATO STO CMRE at a glance: Programme of Work* | **Dr. Alain MAGUER** | NATO STO CMRE | FRA |
| | 10:00 | *MISR - Maritime Intelligence Surveillance and Reconaissance Programme at NATO STO CMRE* | **Dr Emanuel F. COELHO** | NATO STO CMRE | PRT |
| | 10:30 | *Networking coffee break (No host)* | CMRE cafeteria (inside CMRE building) | | |
| Session 2: *Requirements* | 11:00 | ***Keynote Speech**: NATO ACO METOC Support to NATO Operations* | **LtCol DEU-AF Rene HEISE** | NATO ACO-SHAPE | DEU |
| | 11:30 | *Recognised Environmental Picture (REP) – Review on the Requirements and Capabilities to Provide the REP* | **Mr Timothy CLARKE** | Dstl | GBR |
| | 11:45 | *Embedded real-time on board ASW decision support for robotic ASW applications* | **Dr Kevin LEPAGE** | NATO STO CMRE | USA |
| | 12:00 | *Wrap-up of Sessions 1-2* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| Session 3: Challenges | 12:30 | *Balancing Operational Relevance with Basic Research in MCM Experiments* | **Mr Thomas FURFARO** | NATO STO CMRE | USA |
| | 12:45 | *The Italian Hydrographic Institute experience in surf zone modeling simulations* | **Mr Matteo GUIDERI** | IHI | ITA |
| | 13:00 | *Networking lunch break (No host)* | CMRE restaurant/mensa (outside/in front of CMRE) | | |
| | 14:00 | *Course of Action Testbed (COAT) for Mission Planning* | **Dr Aren HUNTER** | DRDC | CAN |
| | 14:15 | *A Reliability Game for source factors impact assessment* | **Mrs Francesca DE ROSA**, and Dr Anne-Laure JOUSSELME | NATO STO CMRE | NLD / CAN |
| | 14:30 | *METOC Impact Maps* | **Dr Jesper BAASCH-LARSEN** | FCOO | DNK |
| | 14:45 | *Underwater communications and networking in polar regions - environmental impact and performance tradeoffs* | **Dr Konstantinos PELEKANAKIS** | NATO STO CMRE | GRC |
| | 15:00 | *Networking coffee break (No host)* | CMRE cafeteria (inside CMRE building) | | |
| | 15:30 | *Wrap-up of Day 1 and Preparation of Day 2* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| | 16:00 | *Time slot for dedicated meetings* | **All Participants** | | |
| | 17:00 | *End of the conference day* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| | 18:30 | *Icebreaker at* ***Doria Park Hotel, Lerici*** | | | |

*NATO STO Centre for Maritime Research and Experimentation* (CMRE)

Figure 3: DeSRA 2017 Conference agenda (page 1 of 3).

*Decision Support and Risk Assessment for Operational Effectiveness* (**DeSRA**) **2017 Conference** - AGENDA

***Tuesday, October 3rd, 2017***

| | Time | Brief title | Speaker | Institution | Nation |
|---|---|---|---|---|---|
| | 09:00 | *Welcome* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| **Session 3: Challenges** | 09:15 | *Challenges in Video Analytics for MISR* | **Dr José A. RODRIGUEZ,** and Mr Daniel RAMOS | GRADIANT | ESP / ESP |
| | 09:30 | *Questions and ideas out of and for Operations Assessment in a JTFHQ (L)* | **LtCol DEU-GS Dr. Jan HOFFMANN** | 1 DEU-NLD Corps | DEU |
| | 09:45 | *Wrap-up of session 3* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| **Session 4: *Solutions*** | 10:00 | *Technical description of SurfZone View – a tactical decision aid for amphibious operations* | **Dr Peter McCOMB** | Defence Tech. Agency | NZL |
| | 10:15 | *GEODE 4D - the future French GEOMETOC Information system* | **OF2 Dr Amélie BARAZZUTTI**, and Mr Vincent DUPUIS | DGA | FRA |
| | 10:30 | *Networking coffee break (No host)* | CMRE cafeteria (inside CMRE building) | | |
| | 11:00 | *DANUBIUS-RI: the pan-European distributed research infrastructure dedicated to interdisciplinary studies of large river–sea systems* | **Dr Francesca DE PASCALIS** | CNR-ISMAR | ITA |
| | 11:15 | *Demonstrating real time acoustic predictions during exercise Dynamic Mongoose 2017* | **Mr Manlio ODDONE** | NATO STO CMRE | ITA |
| | 11:30 | *Using and adapting the in-house developed, platform independent Combat Management System "MESE" for ACINT and ASW missions* | **LtCdr DEU-N Volker VOSS** | DEU Naval Support Command | DEU |
| | 11:45 | *Vessel destination estimation under uncertainty with Valuation Networks* | **Dr Nadia BEN ABDALLAH**, and Dr Anne-Laure JOUSSELME | NATO STO CMRE | FRA / CAN |
| | 12:00 | *Synthetic Trajectory Estimation and Evaluation for Maritime Anomaly Detection* | **Mr Mathias ANNEKEN** | KIT | DEU |
| | **12:30** | ***Picture of participants*** *(Main Gate/Entrance CMRE building)* | **All participants** | | |
| | 13:00 | *Networking lunch break (No host)* | CMRE restaurant/mensa (outside/in front of CMRE) | | |
| | 14:00 | *A System for Alert Triggering based on Automatic Identification System (AIS) Data Integrity Analysis* | **Mr Clément IPHAR**, and Dr Cyril RAY | MINES ParisTech | FRA |
| | 14:15 | *Abnormal behavior detection by means of the Ornstein-Uhlenbeck process* | **Dr Paolo BRACA and Mrs Enrica D'AFFLISIO** | NATO STO CMRE | ITA / ITA |
| | 14:45 | *Latest generation of innovative and intuitive C2 and Sonobuoy Processing Systems* | **Mr. Michel LILETTE** | THALES | FRA |
| | 15:00 | *Networking coffee break (No host)* | CMRE cafeteria (inside CMRE building) | | |
| | 15:30 | *Deimos Imaging Portfolio: present and future for Maritime Intelligence and Surveillance* | **Mr Roberto FABRIZI** | DEIMOS IMAGING | ITA |
| | 15:45 | *Operational Tools and Expanding Capabilities of Slocum Gliders* | **Mr Benjamin ALLSUP** | Teledyne | USA |
| | 16:00 | *Wrap-up of session 4* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| | 16:15 | *Time slot for dedicated meetings* | **All Participants** | | |
| | 17:00 | *End of the conference day* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| | 20:00 | *No host dinner:* ***Ristorante Il Cristobal*** *(Colombo),* ***San Terenzo*** | | | |

*NATO STO Centre for Maritime Research and Experimentation* (CMRE)

Figure 4: DeSRA 2017 Conference agenda (page 2 of 3).

***Wednesday, October 4th, 2017***

| | Time | Brief title | Speaker | Institution | Nation |
|---|---|---|---|---|---|
| | 09:00 | *Welcome* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| ***Session 5: Experimentation*** | 09:15 | *An experiment on the impact of ocean environment variability on long range acoustic propagation in a high latitude region* | **Dr. Yong-Min JIANG** | NATO STO CMRE | CAN |
| | 09:30 | *Future JISR possibilities* | **Maj NOR-A Tommy MYRVOLL** | NOR-JISR | NOR |
| | 09:45 | *Oceanids C2. A Command and Control Infrastructure for the UK unmanned long-range fleet* | **Mr Alvaro LORENZO** | NOC | ESP |
| | 10:00 | *GliderC2 – Interoperable Unmanned Underwater Glider Command & Control capability at CMRE: Tested in NATO Exercises* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| | 10:15 | *Physical and human factors and their influence on marine robotic fleet operations: lessons learned from four years of MASSMO missions* | **Dr Russell WYNN** | NOC | GBR |
| | 10:30 | *Networking coffee break (No host)* | CMRE cafeteria (inside CMRE building) | | |
| | 11:00 | *High Latitudes environmental characterization challenges and the scientific sea trial NREP17* | **Mr Aniello RUSSO** | NATO STO CMRE | ITA |
| | 11:15 | *Dynamic Mongoose 2017 (DYMO17): METOC support for an advanced ASW Exercise* | **Cdr DEU-N Stefan WITTWER** | NATO STO CMRE | ITA |
| | 11:30 | *Wrap-up of session 5* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| ***Session 6: Discussion and Prospective Collaborations*** | 11:45 | *Introduction to discussion of prospective collaborations* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| | | *Session for discussing prospective collaborations and dedicated meetings* | **All participants** | | |
| | 12:30 | *Wrap-up of discussion of prospective collaborations* | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| | 12:30 | *Summary of DeSRA17* | **Dr Raúl VICEN**<br>**Dr Emanuel F. COELHO**<br>**Mrs Giuliana PENNUCCI**<br>**All participants** | NATO STO CMRE<br>NATO STO CMRE<br>NATO STO CMRE | ESP<br>PRT<br>ITA |
| | 13:00 | *End of DeSRA 2017 Conference* | | | |

**Points of contact**

General Chair:

***Dr Raúl VICEN*** - Raul.Vicen@cmre.nato.int

Co-Chairs:

***Dr Emanuel F. COELHO*** - Emanuel.Coelho@cmre.nato.int
***Mrs Giuliana PENNUCCI*** - Giuliana.Pennucci@cmre.nato.int

Secretary:

***Mrs Felicita DI STEFANO*** - Felicita.Distefano@cmre.nato.int

*NATO STO Centre for Maritime Research and Experimentation* (CMRE)

Figure 5: DeSRA 2017 Conference agenda (page 3 of 3).

## 2.2 List of Abstracts

The Abstracts published in these DeSRA 2017 Conference Proceedings passed a peer-review process. The accepted Abstracts are listed below, sorted by surname of first author. Author/s, affiliations, title, abstract and references are provided for each of them in Section 3 of this CMRE report.

Benjamin ALLSUP, Chris DECOLLIBUS, and Clayton JONES, "*Operational Tools and Expanding Capabilities of Slocum Gliders*", Teledyne Webb Research, USA

Mathias ANNEKEN, Anne-Laure JOUSSELME, and Yvonne FISCHER, "*Synthetic Trajectory Estimation and Evaluation for Maritime Anomaly Detection*", KIT, NATO STO CMRE and Fraunhofer IOSB, DEU

Jesper BAASCH-LARSEN, "*METOC Impact Maps*", FCOO, DNK

Amélie BARAZZUTTI, and Vincent DUPUIS, "*GEODE 4D - the future French GEOMETOC Information system*", DGA, FRA

Nadia BEN ABDALLAH, and Anne-Laure JOUSSELME, "*Vessel destination estimation under uncertainty with Valuation Networks*", NATO STO CMRE

Timothy CLARKE, "*Recognised Environmental Picture (REP) – Review on the Requirements and Capabilities to Provide the REP*", DSTL, GBR

James COWLES, "*Inside Mission Control – Challenges of Over-the-Horizon Autonomy*", ASV Global, GBR

Maurizio DEMARTE, and Matteo GUIDERI, "*The Italian Hydrographic Institute experience in surf zone modelling simulations*", IHI, ITA

Francesca DE PASCALIS, Georg UMGIESSER, Debora BELLAFIORE, Adrian STANICA, "*Debiasing effects of information visualisation*", CNR- ISMAR, OACMR and GeoEcoMar, ITA

Francesca DE ROSA, and Anne-Laure JOUSSELME, "*A Reliability Game for source factors impact assessment*", NATO STO CMRE

Roberto FABRIZI, "*Deimos Imaging Portfolio: present and future for Maritime Intelligence and Surveillance*", Deimos Imaging, ESP

Thomas FURFARO, Samantha DUGELAY, and Christopher STRODE, "*Balancing Operational Relevance with Basic Research in MCM Experiments*", NATO STO CMRE

Sally GARRET, Peter MCCOMB, and Rafael GUEDES, "*Technical description of SurfZone View - a tactical decision aid for amphibious operations*", Defence Technology Agency, NZL

Charalampos GIANNAKOPOULOS, "*Preparatory Action on Defence Research – Situational awareness in a naval environment*", European Commission

Rene HEISE, "*NATO ACO METOC Support to NATO Operations*", NATO ACO / SHAPE

Jan HOFFMANN, "*Questions and ideas out of and for Operations Assessment in a JTFHQ (L)*", 1GNC, DEU

Aren HUNTER, Tania RANDALL, and Mark HAZEN, "*Course of Action Testbed (COAT) for Mission Planning*", DRDC, CAN

Clément IPHAR, Aldo NAPOLI, and Cyril RAY, "*A System for Alert Triggering based on Automatic Identification System (AIS) Data Integrity Analysis*", CRC MINES ParisTech & IRENav, FRA

Michel LILETTE, "*Solutions for mission optimization in a complex environment. Latest generation of innovative and intuitive C2 and Sonobuoy Processing Systems*", THALES, FRA

Alvaro LORENZO-LOPEZ, Alexander Brian PHILLIPS, Catherine HARRIS, "*Oceanids C2. A Command and Control Infrastructure for the UK unmanned long-range fleet*", NOC, GBR

Tommy MIRVOLL, "*Future JISR possibilities*", NOBLE, NOR

Konstantinos PELEKANAKIS, and Roberto PETROCCIA, "*Underwater communications and networking in polar regions - environmental impact and performance tradeoffs*", NATO STO CMRE

José A. RODRIGUEZ, Daniel GONZALEZ, Daniel PEREIRA, Vicente MACHADO, Jorge NAYA, and Hugo GARCIA, "*Challenges in Video Analytics for MISR*", GRADIANT, ESP

Christopher STRODE, and Manlio ODDONE, "*Demonstrating real time acoustic predictions during exercise Dynamic Mongoose 2017*", NATO STO CMRE

Raúl VICEN-BUENO, Giampaolo CIMINO, and Daniele CECCHI, "*GliderC2 - Interoperable Unmanned Underwater Glider Command & Control capability at CMRE: Tested in NATO Exercises*", NATO STO CMRE

Volker VOSS, "*Using and adapting the in-house developed, platform independent Combat Management System "MESE" for ACINT and ASW missions*", MUKdo, DEU

Russell WYNN, "*Physical and human factors and their influence on marine robotic fleet operations: lessons learned from four years of MASSMO missions*", NOC, GBR

## 2.3 Participants: External and Internal

Figure 6 summarizes the participants in the DeSRA 2017 Conference, including the nation and organization/institution each of them represents.


*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*


**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

| | *Participant* | *Institution / Organiztion* | *Nation* |
|---|---|---|---|
| 1 | **Mr Ben ALLSUP** | Teledyne | USA |
| 2 | **Mr Mathias ANNEKEN** | KIT | DEU |
| 3 | **Dr Jesper BAASCH-LARSEN** | FCOO | DNK |
| 4 | **Mr Adrian BAKER** | DsTL, Porton Down | GBR |
| 5 | **OF2 Dr Amelie BARAZZUTTI** | DGA | FRA |
| 6 | **Mr Timothy CLARKE** | DsTL, Porton Down | GBR |
| 7 | **Dr Francesca DE PASCALIS** | ISMAR - CNR | ITA |
| 8 | **Mr Pierre DUBOIS** | ROCKWELL COLLINS FRANCE | FRA |
| 9 | **Dr Vincent DUPUIS** | DGA | FRA |
| 10 | **Mr Roberto FABRIZI** | DEIMOS IMAGING | ITA |
| 11 | **Mr Paolo A. GEMELLI** | UNIGE - DED Polytechnic School | ITA |
| 12 | **Mr Daniel GONZALEZ** | GRADIANT | ESP |
| 13 | **Mr Matteo GUIDIERI** | Italian Navy Hydrographic Institute | ITA |
| 14 | **Mr. Valentin HANNS** | Teledyne Webb Research | FRA |
| 15 | **LtCol DEU-AF Rene HEISE** | NATO ACO/SHAPE | DEU |
| 16 | **LtCol DEU-GS Dr Jan HOFFMANN** | JTFHQ (L) | DEU |
| 17 | **Dr Aren HUNTER** | DRDC Atlantic | CAN |
| 18 | **Mr Clément IPHAR** | CRC - MINES ParisTech | FRA |
| 19 | **Mr Michel LILETTE** | THALES | FRA |
| 20 | **Mr Alvaro LORENZO** | NOC | ESP |
| 21 | **LT ITA-N Raffaele MARTINO** | MARICOSOM Rome | ITA |
| 22 | **Dr Peter MCCOMB** | Defence Technology Agency | NZL |
| 23 | **Dr Andrea MUNAFÒ** | NOC | ITA |
| 24 | **Maj NOR-A Tommy MYRVOLL** | NOBLE - Noewegian Cyber Defence | NOR |
| 25 | **Mr Daniel RAMOS** | GRADIANT | ESP |
| 26 | **Dr Cyril RAY** | IRENav - Ecole Navale France | FRA |
| 27 | **Mr Luca REPETTI** | Italian Navy Hydrographic Institute | ITA |
| 28 | **Dr Jose A. RODRIGUEZ** | GRADIANT | ESP |
| 29 | **Dr Sylvia ULLMER** | German Navy HQ | DEU |
| 30 | **LtCdr DEU-N Volker VOSS** | German Naval Support Command | DEU |
| 31 | **Dr Russell WYNN** | NOC | GBR |
| | | | |
| 1 | **Dr Nadia BEN ABDALLAH** | NATO STO CMRE | FRA |
| 2 | **Dr Paolo BRACA** | NATO STO CMRE | ITA |
| 3 | **Dr Emanuel COELHO** | NATO STO CMRE | PRT |
| 4 | **Dr Enrica D'AFFLISIO** | NATO STO CMRE | ITA |
| 5 | **Mrs Francesca DE ROSA** | NATO STO CMRE | ITA |
| 6 | **Mr Thomas FURFARO** | NATO STO CMRE | USA |
| 7 | **Dr Bart GIPS** | NATO STO CMRE | NLD |
| 8 | **Yong-Min JIANG** | NATO STO CMRE | CAN |
| 9 | **Dr Anne-Laure JOUSSELME** | NATO STO CMRE | CAN |
| 10 | **Dr Kevin LEPAGE** | NATO STO CMRE | USA |
| 11 | **Dr Alain MAGUER** | NATO STO CMRE | FRA |
| 12 | **Mr Manlio ODDONE** | NATO STO CMRE | ITA |
| 13 | **Dr Konstantinos PELEKANAKIS** | NATO STO CMRE | GRC |
| 14 | **Mrs Giuliana PENNUCCI** | NATO STO CMRE | ITA |
| 15 | **Mr Aniello RUSSO** | NATO STO CMRE | ITA |
| 16 | **Mr Benjamin THOMAS** | NATO STO CMRE | GBR |
| 17 | **Dr Raúl VICEN** | NATO STO CMRE | ESP |
| 18 | **Cdr DEU-N Stefan WITTWER** | NATO STO CMRE | DEU |

Figure 6: DeSRA 2017 Conference participants: External and Internal.

## 2.4 Participating NATO nations and bodies

Figure 7 summarizes the NATO nations and bodies participating in the DeSRA 2017 Conference.

A summary of the number of NATO nations and bodies is provided below:

- 13 NATO and NATO Partner nations: CAN, DEU, DNK, ESP, FRA, GBR, GRC, ITA, NLD, NOR, NZL, PRT, USA

- 2 NATO bodies: NATO ACO/SHAPE, NATO STO CMRE

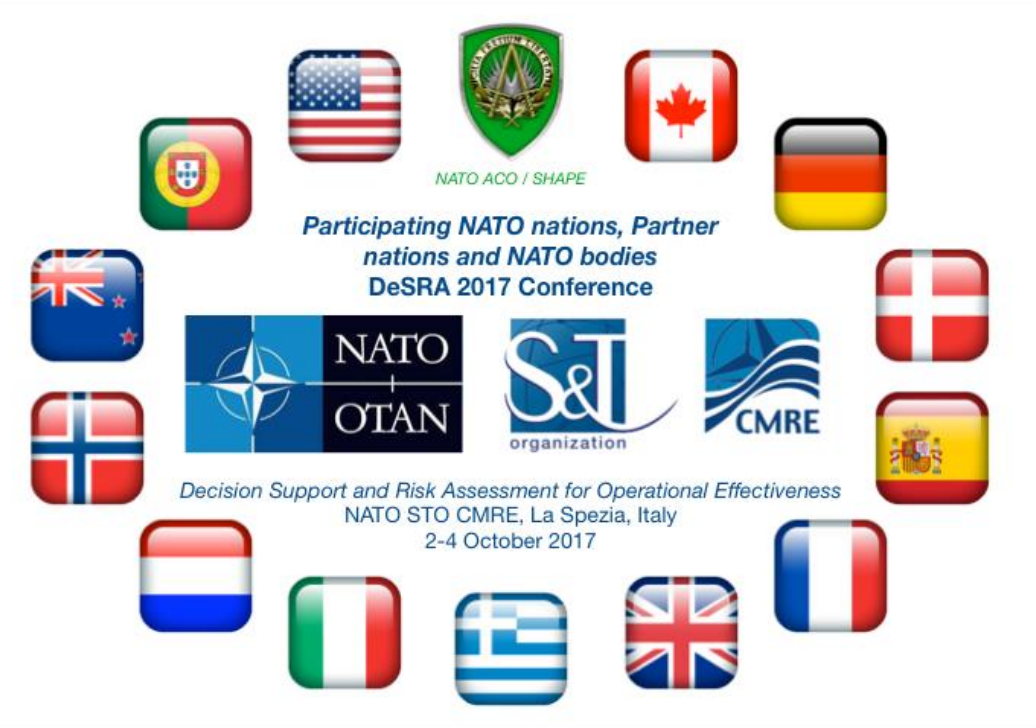


Figure 7: NATO nations and bodies participating in the DeSRA 2017 Conference.

## 2.5 Participating institutions and organizations

Figure 8 summarizes the institutions and organizations participating in the DeSRA 2017 Conference.

A summary of the number of institutions and organizations is provided below, sorting them by bodies or nations:

> 20 institutions/organizations: 1 CAN, 2 DEU, 1 DNK, 2 ESP, 4 FRA, 2 GBR, 4 ITA, 1 NLD, 1 NOR, 1 NZL, 1 USA
>
> 2 NATO bodies: NATO ACO/SHAPE, NATO STO CMRE

The list of NATO bodies, institutions and organizations participating in the DeSRA 2017 Conference, as well as their official websites is provided below:

NATO – STO Centre for Maritime Research and Experimentation (CMRE): www.cmre.nato.int

NATO – Allied Command Operations (ACO)/Supreme Headquarters Allied Powers Europe (SHAPE): www.shape.nato.int

CAN – Defence Research and Development Canada (DRDC):www.drdc-rddc.gc.ca

DEU – Headquarters 1(German/Netherlands) Corps (1GNC): http://1gnc.org/

DEU – German Naval Support Command (MUKdo): www.marine.de & www.bundeswehr.de

DNK – Defence Centre for Operational Oceanography (FCOO): www.fcoo.dk

ESP - Galician Research and Development Center in Advanced Telecommunications (GRADIANT): www.gradiant.org/?lang=en

ESP – Deimos Imaging, an UrtheCast Company [Deimos Imaging]: www.deimos-imaging.com

FRA – MINES ParisTech - PSL Research University - Centre de Recherche sur les Risques et les Crises (MINES ParisTech): www.crc.mines-paristech.fr/en/

FRA – Direction Générale de l'Armement - French MoD Procurement Agency (DGA): www.defense.gouv.fr/dga

FRA – Rockwell-Collins France (RCF): http://rockwellcollins.com/france

FRA – Thales Underwater Systems SAS (THALES): www.thalesgroup.com

GBR – Defence Science and Technology Laboratory (DSTL): www.gov.uk/government/organisations/defence-science-and-technology-laboratory

GBR – National Oceanographic Centre (NOC): http://noc.ac.uk

ITA – Consiglio Nazionale delle Ricerche - Istituto di Scienze Marine (CNR-ISMAR): www.ismar.cnr.it

ITA - Italian Hydrographic Institute (IHI): www.marina.difesa.it/conosciamoci/organizzazione/comandienti/scientifici/idrografico/Pagine/home.aspx

ITA – Comando Sommergibili Marina (MARICOSOM ROME): www.marina.difesa.it

ITA – University of Genoa, Architecture and Design Department, Polytechnic School (Dad): https://archittetura.unige.it/

NOR – Norwegian Battle Lab & Experimentation (NOBLE): https://forsvaret.no

NZL – MetOcean Solutions and the Meteorological Service of New Zealand (MOS): www.metocean.co.nz

USA – Teledyne Marine: www.teledynemarine.com/vehicles/

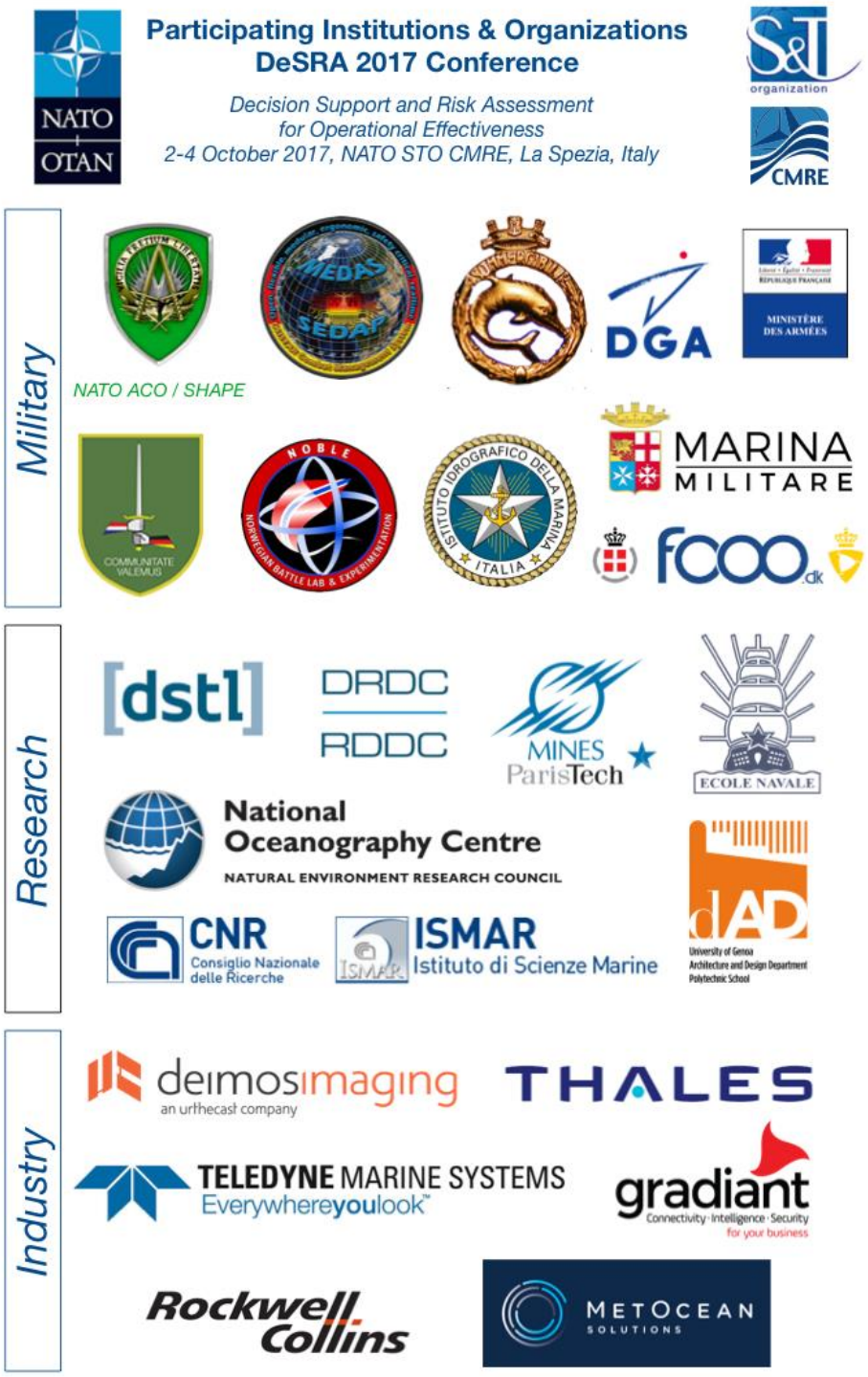


Figure 8: NATO bodies and institutions/organizations participating in the DeSRA 2017 Conference.

# 3
# DeSRA 2017 Conference Abstracts

## 3.1 Benjamin ALLSUP, Chris DECOLLIBUS, and Clayton JONES, "*Operational Tools and Expanding Capabilities of Slocum Gliders*", Teledyne Webb Research, USA


***Mr. Benjamin ALLSUP, Mr. Chris DECOLLIBUS and Mr. Clayton JONES***

TWR - Teledyne Webb Research, USA

***Operational Tools and Expanding Capabilities of Slocum Gliders***

Abstract:

Teledyne Webb Research (TWR) [1] presents the features of the newly released Slocum Flight Mission Control (SFMC) tools, the soon to be available G3 processor and significant new Glider operational capabilities. With these enhancements TWR is striving to increase the ease of operation of either a single glider to fleets of gliders. TWR is also continuing to be at the forefront of expanding the capability and effectiveness of Gliders in all operational capacities.

References:

[1] http://www.teledynemarine.com/webb-research

## 3.2 Mathias ANNEKEN, Anne-Laure JOUSSELME, and Yvonne FISCHER, "*Synthetic Trajectory Estimation and Evaluation for Maritime Anomaly Detection*", KIT, NATO STO CMRE and Fraunhofer IOSB, DEU



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***Mr. Mathias ANNEKEN (a), Dr. Anne-Laure JOUSSELME (b), and Dr. Yvonne FISCHER (c)***

(a) KIT – Karlsruhe Institute of Technology, DEU

(b) NATO STO CMRE – Centre for Maritime Research and Experimentation

(c) Fraunhofer IOSB – Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung, DEU

***Synthetic Trajectory Estimation and Evaluation for Maritime Anomaly Detection***

Abstract:

In order to improve Maritime Situation Awareness, the understanding of vessel traffic is of utter importance. Based on the widely available Automatic Identification System (AIS), a vast and steadily increasing amount of data is collected, overwhelming human operators of surveillance systems. Thus, an automatic approach to extract information for improving the understanding of the situation is needed. One keystone is the extraction of normal movement patterns by discovering clusters of similar movement as routes and building a synthetic trajectory as a model [1]. The gathered information of higher quality can be used for anomaly detection and path prediction [2].

The representation of maritime routes should be light, faithful, and robust to density of maritime traffic. Therefore, an algorithm is introduced, which estimates the synthetic trajectory by dividing it into segments and applying a Gaussian Mixture Model in combination with a Dirichlet Process [3, 4] in order to estimate the density of the displacement in each segment to the trajectory's mean. The algorithm is evaluated with artificial and real data, covering often seen patterns of movement.

Compared to other approaches, it provides a lighter representation and makes it possible to model the movement patterns around small islands and shallow water faithfully.

References:

[1] G. Pallotta, M. Vespe and K. Bryan, Vessel Pattern Knowledge Discovery from AIS Data: A Framework for Anomaly Detection and Route Prediction, Entropy 2013, 15, 2218-2245, 2013.

[2] M. Anneken, Y. Fischer and J. Beyerer, A Multi-agent Approach to Model and Analyze the Behavior of Vessels in the Maritime Domain, In Proceedings of the 9th International Conference on Agents and Artificial Intelligence - Volume 1: ICAART, pages 200-207, 2017.

[3] H. Attias, A Variational Bayesian Framework for Graphical Models, In Advances in Neural Information Processing Systems 12, 2000.

[4] D. M. Blei and M. I. Jordan, Variational inference for Dirichlet process mixtures, Bayesian analysis 1.1, 2006.

## 3.3 Jesper BAASCH-LARSEN, "*METOC Impact Maps*", FCOO, DNK



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***Dr. Jesper BAASCH-LARSEN***

FCOO - Danish Defence Centre for Operational Oceanography, DNK

***METOC Impact Maps***

Abstract:

Not releasable.

References:

Not releasable.

## 3.4 Amélie BARAZZUTTI, and Vincent DUPUIS, "GEODE 4D - the future French GEOMETOC Information system", DGA, FRA




*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***Dr. OF-2 Amélie BARAZZUTTI, and Mr. Vincent DUPUIS***

FRANCE - DGA - French MOD Procurement Agency, FRA

***GEODE 4D - the future French GEOMETOC Information system***

Abstract:

The French MOD [1] is currently developing a GEOMETOC (geography, hydrography, meteorology and oceanography) information system, which will comply with the NATO concept of REP (Recognized Environmental Picture) principles.

This program, called GEODE 4D, will allow the federation of the environmental domains (Geography, Hydrography, Oceanography and Meteorology) into a single GEOMETOC information system, providing a valid, complete, coherent and interoperable REP in order to plan and conduct operations, from strategic to tactical level.

GHOM data providers will dispose of specific custom-made tools to collect data, bring their expertise and elaborate the REP in accordance with operational needs. The REP will then be available for consultation with the GEODE 4D portal, connected on French military network, on all classified levels, on mother land or abroad on ships or theatres, allowing data download or service consumption (OGC – Open Geospatial Consortium). The REP is updated in real time by GHOM (geography, hydrography, meteorology and oceanography) data providers, especially for METOC data, as they perish rapidly.

This program represents a significant breakthrough in associating GEO and METOC data in the simplest way possible to ease assimilation and operational use of such complex and heavy data by military forces.

References:

[1] http://www.defense.gouv.fr/english/dga

## 3.5 Nadia BEN ABDALLAH, and Anne-Laure JOUSSELME, "Vessel destination estimation under uncertainty with Valuation Networks", NATO STO CMRE



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Dr. Nadia BEN ABDALLAH, and Dr. Anne-Laure JOUSSELME***

NATO STO CMRE – NATO Science and Technology Organization Centre for Maritime Research and Experimentation

***Vessel destination estimation under uncertainty with Valuation Networks***

Abstract:

Accurate knowledge of vessels destination is required for maritime security and to optimize the efficiency of ports organization. Unfortunately, the AIS Destination field is manually fed in and thus highly prone to errors. It was shown to be obviously erroneous (ambiguous, missing, intentionally falsified) in half of the cases in the research of Harati-Mokhtari et al. [1]. Information fusion of different sources can greatly improve the accuracy of the estimation while detecting possible inconsistency of interest. The sources can be sensor systems (RADARs, AIS), information systems (prediction algorithms, databases), or operators (expert knowledge).

In this work, we propose a general information fusion setting to estimate vessels destination based on valuations networks [2] – a general formal mathematical reasoning framework. The setting: (1) combines a variety of heterogeneous sources while accounting for their reliability; (2) accounts for the different dimensions and sources of uncertainty through the use of a flexible uncertainty model and (3) has been extended to provide different information quality measures (uncertainty and inconsistency). We focus on the inconsistency dimension as an indicator of destination anomalies.

References:

[1] Harati-Mokhtari A., Wall A., Brooks P., and Wang J., Automatic Identification System (AIS): Data Reliability and Human Error Implications, Journal of Navigation, 60(03):373, ISSN 1469-7785, doi: 10.1017/s0373463307004298, August 2007.

[2] Shenoy PP., A Valuation-Based Language for Expert Systems, Int. J. of Approx. Reas., 3(2), 383–411, 1989.

## 3.6 Timothy CLARKE, "Recognised Environmental Picture (REP) – Review on the Requirements and Capabilities to Provide the REP", DSTL, GBR



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***Mr. Timothy CLARKE***

Defence Science and Technology Laboratory (DSTL), GBR

***Recognised Environmental Picture (REP) – Review on the Requirements and Capabilities to Provide the REP***

Abstract:

Not releasable.

References:

Not releasable.

## 3.7 James COWLES, "Inside Mission Control – Challenges of Over-the-Horizon Autonomy", ASV Global, GBR



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***Mr. James COWLES***

ASV Global, GBR

***Inside Mission Control – Challenges of Over-the-Horizon Autonomy***

Abstract:

ASV Global (ASV) have completed several over the horizon operations and have recently opened its Mission Control Centre specifically to further research in this area and increase over-the-horizon capabilities.

This presentation will discuss the challenges involved in the use of over-the-horizon autonomy, the lessons learnt from the recent MASSMO 4 operation and other research in this area.

Specific focus will be the ongoing Innovate UK USMOOTH project and ASVs' advanced autonomy developments. Under the USMOOTH project, ASV has developed, built and tested an optimised EO-sensor suite, alongside a domain specific-, ROI-based- video compression framework to improve the remote operator situation awareness though low-bandwidth, high-latency communication link, which looks at sensor and communication technologies. ASVs' advanced autonomy system utilises a collision regulation aware layer control approach, which provides autonomy in a way that supports the ability for autonomous systems to share the water with conventional manned shipping.

The full benefits of autonomous vehicles cannot be realised without the exploitation of over the horizon operations and this presentation will show how the progression of these developments.

References:

None.

## 3.8 Maurizio DEMARTE, and Matteo GUIDERI, "The Italian Hydrographic Institute experience in surf zone modelling simulations", IHI, ITA




*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***Cdr. Maurizio DEMARTE, and Mr. Matteo GUIDERI***

IHI – Italian Hydrographic Institute, ITA

***The Italian Hydrographic Institute experience in surf zone modelling simulations***

Abstract:

The Oceanography and Marine Geophysics Department of the Italian Hydrographic Institute (IHI) is testing SurfZoneView [1], a surf zone prediction and assessment tool that combines a robust near-shore numerical model with a simple and intuitive graphical user interface, to allow easily setting up simulations, running the model, visualizing the results and processing output of some important aspects of the surf zone. The tool has been developed by MetOcean Solution for the New Zealand Defence Force to assist in amphibious operations. This presentation illustrates the work done during shallow water and landing operations, providing a rapid assessment of waves and currents in the surf zone.

References:

[1] Guedes R.M.C., Lobato A.A.F., Johnson D., Ruglys M. and Garrett S., SurfZoneView: a modelling-based tool to assess surf zone conditions and support amphibious beach landing operations, Costal and Ports Conference, Auckland, 2015.

## 3.9 Francesca DE PASCALIS, Georg UMGIESSER, Debora BELLAFIORE, Adrian STANICA, "*Debiasing effects of information visualisation*", CNR-ISMAR, OACMR and GeoEcoMar, ITA


*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*


DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***Dr. Francesca DE PASCALIS (a), Dr. Georg UMGIESSER (a,b), Dr. Debora BELLAFIORE (a), Dr. Adrian STANICA (c)***

(a) CNR-ISMAR - National Research Council – Institute of Marine Sciences, ITA

(b) OACMR - Open Access Center for Marine Research, Klaipeda University, LTU

(c) GeoEcoMar - Romanian National Institute for Marine Geology and Geoecology, ROU

***DANUBIUS-RI: the pan-European distributed research infrastructure dedicated to interdisciplinary studies of large river–sea systems***

Abstract:

The DANUBIUS Research Infrastructure (DANUBIUS-RI) is a new initiative to address the challenges and opportunities of research on large river- sea (RS) systems. DANUBIUS-RI is a distributed pan-European RI that will provide a platform for interdisciplinary research. It will deal with RS investigation through facilities and expertise from a large number of European institutions becoming a 'one-stop shop' for knowledge exchange in managing RS systems, ranging from freshwater to marine research.

Globally, RS systems are complex and dynamic, with huge environmental, social and economic value. They are poorly understood but under increasing pressure through pollution, hydraulic engineering, water supply, energy, flood control and erosion. RS systems in Europe are among the most impacted globally, after centuries of industrialization, urbanization and agricultural intensification. Improved understanding is essential to avoid irreversible degradation and for restoration.

DANUBIUS-RI will physically comprise a Hub, Supersites and Nodes distributed across Europe to optimize the use of existing world leading expertise and facilities and enhance the potential to undertake cross-disciplinary research on freshwater – marine systems, and hence understand, characterize and manage these diverse systems across Europe.

DANUBIUS-RI will create new knowledge through consistent and state of the art observation, analysis and modelling also integrating scientific, social and economic

disciplines (Nodes). The application in different River Sea Systems (Supersites) around Europe will foster intuitions and perceptions that go beyond disciplines and geographical boundaries to find new solutions for more aware decision-making processes.

References:

None.

## 3.10 Francesca DE ROSA, and Anne-Laure JOUSSELME, "*A Reliability Game for source factors impact assessment*", NATO STO CMRE



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Mrs. Francesca DE ROSA, and Dr. Anne-Laure JOUSSELME***

NATO STO CMRE – NATO Science and Technology Organization Centre for Maritime Research and Experimentation

***A Reliability Game for source factors impact assessment***

Abstract:

Decision support tools are requested to deal with an ever-growing amount of data, to ensure an improved Maritime Situational Awareness for the decision maker. The use of those data is not just challenging because of their big volume and the high speed at which they are generated, but also because of their variety and possible lack of veracity. In fact data can come from sources that differ in nature (e.g. hard vs. soft [1]), can be structured or unstructured and can be communicated in different ways (e.g. numerical values or natural language). To get benefit of the variety of sources beyond the ones traditionally in use, we need to correctly account for data source factors (e.g. source reliability [2] and source type) in fusion processes [3,4]. We will present the Reliability Game methodology developed and tested at CMRE in order to understand, characterise and quantify the impact of source factors on human reasoning. The results of the Reliability Game aim at informing the development of multi-sources automated reasoners to be included in future decision support tools. We will show some preliminary outcomes from the first session played on a maritime scenario concerning a possible issue of safety or security.

References:

[1] Jousselme A.-L. , Boury-Brisset A.-C., Debaque B. , Prevost D., Characterization of hard and soft sources of information: A practical illustration, In: Proc. of Information Fusion, 2014.

[2] North Atlantic Treaty Organization, Allied Joint Doctrine for Intelligence Procedures AJP-2.1, Brussels, Belgium, 2016.

[3] RogovaG., Nimier V., Reliability in information fusion: literature survey, In: Proc. of Information Fusion, pp. 1158–1165, 2004.

[4] Mercier D., Pichon F., Lefèvre É., Delmotte F., Learning Contextual Discounting and Contextual Reinforcement from Labelled Data, In: Destercke S., Denoeux T. (eds)

Symbolic and Quantitative Approaches to Reasoning with Uncertainty, ECSQARU, Lecture Notes in Computer Science, vol 9161, Springer, 2015.

## 3.11 Roberto FABRIZI, "Deimos Imaging Portfolio: present and future for Maritime Intelligence and Surveillance", Deimos Imaging, ESP




*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

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NATO STO CMRE, La Spezia, Italy

***Mr. Roberto FABRIZI***

DMI – Deimos Imaging, ESP

***Deimos Imaging Portfolio: present and future for Maritime Intelligence and Surveillance***

Abstract:

Deimos Imaging is a Spanish company [1], subsidiary of the Canadian UrtheCast Corp, and one of the world leading satellite imagery providers. It owns and operates the Deimos-1 and Deimos-2 satellites, which are operated continuously through a 24/7 service for emergency and maritime surveillance. Deimos Imaging provides high-quality services to clients worldwide, including the supply of imagery from our own constellation of satellites and from the satellites of our partners from the PanGeo Alliance, the first global alliance of Earth Observation sensor operators that assures daily global imaging and multiple revisits per day over any target.

In addition, Deimos Imaging is developing two EO satellite constellations: UrtheDaily™ (2019), formed by eight satellites designed to capture the Earth's entire landmass every day at 5m resolution, complimenting Sentinel-2 and Landsat applications, and OptiSAR™ (2021), the world's first fully-integrated constellation of sixteen multispectral optical and SAR satellites. Through Kanvas, Deimos Imaging's and UrtheCast's new imagery service in ArcGIS, Esri users can access timely, reliable and quality assured imagery, directly into their apps and desktops. NATO Core GIS service (powered by ESRI´s ArcGIS) can seamlessly leverage our space assets and services.

References:

[1] http://www.deimos-imaging.com/

## 3.12 Thomas FURFARO, Samantha DUGELAY, and Christopher STRODE, "*Balancing Operational Relevance with Basic Research in MCM Experiments*", NATO STO CMRE



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Mr. Thomas FURFARO, Dr. Samantha DUGELAY, and Mr. Christopher STRODE***

NATO STO CMRE – NATO Science and Technology Organization Centre for Maritime Research and Experimentation

***Balancing Operational Relevance with Basic Research in MCM Experiments***

Abstract:

CMRE's Autonomous Naval Mine Countermeasures (ANMCM) programme uses the combination of planning and evaluation tools with sea-borne experimentation as the basis and metric for evaluating developments in core technologies, such as novel sensors, cutting edge automatic target recognition (ATR), and autonomous frameworks for single- and multi-agent collaboration. Experimentation includes operational and scientific exercises. In operational environments, the contributions are manifold – P&E expertise can used to provide independent verification and feedback to operators regarding their performance; the Collaborative Autonomous Mine Countermeasures (CAMCM) project may use the squad of Unmanned Maritime Systems (UMS) to perform in-stride PC trials for comparison versus other systems (traditional or otherwise); a toolset for in situ P&E evaluation can be deployed alongside autonomy solutions to create closed-loop feedback between online performance estimation and resulting machine-driven decision making. Conversely, scientific trials have a significantly dampened focus on P&E products, with emphasis placed on providing a conducive environment for achieving stretch scientific goals.

References:

None.

## 3.13 Sally GARRET, Peter MCCOMB, and Rafael GUEDES, "Technical description of SurfZone View - a tactical decision aid for amphibious operations", Defence Technology Agency, NZL



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

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NATO STO CMRE, La Spezia, Italy

***Mrs. Sally GARRET, Dr. Peter MCCOMB, and Dr. Rafael GUEDES***

Defence Technology Agency – New Zealand Defence Force, MetOcean Solutions, MetOcean Solutions, NZL

***Technical description of SurfZone View – a tactical decision aid for amphibious operations***

Abstract:

Amphibious warfare is one of the most complex operations in modern warfare. SurfZoneView (SZV) is the New Zealand Defence Force (NZDF) modelling and tactical decision aid tool that was developed to plan and execute safe successful beach landing operations. SZV uses the XBeach numerical model to provide a fast and robust prediction of near-shore waves and currents. Here we present the development and some technical aspects of SurfZoneView including sensitive testing to define how the model is set up and run as well as validation against real data from SandyDuck field experiment [1]. We show how SZV has been used to support training exercises for the NZDF and the potential for rapid, accurate assessment of near-shore conditions alongside the wave buoy under development by New Zealand's Defense Technology Agency (DTA).

References:

[1] BirkemeierW.A., SandyDuck '97 and Duck98 nearshore field experiments, Annual Report, US Army Engineer Waterways Experiment Station, 7pp, 1998.

## 3.14 Charalampos GIANNAKOPOULOS, "Preparatory Action on Defence Research – Situational awareness in a naval environment", European Commission




*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Mr. Charalampos GIANNAKOPOULOS***

European Commission, DG GROW, Unit I4

***Preparatory Action on Defence Research – Situational awareness in a naval environment***

Abstract:

The presentation covers the political context for the EU funded defence research activity, explains the function and structure of the preparatory action, provides information on the 2017 work programme, in particular the technological demonstrator for enhanced situational awareness in a naval environment call for proposals, and gives an overview of the preliminary work on the future European defence research programme.

References:

None.

## 3.15 Rene HEISE, "NATO ACO METOC Support to NATO Operations", NATO ACO / SHAPE


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DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***LtCol. OF-4 DEU-AF Rene HEISE***

NATO ACO / SHAPE – NATO Allied Command Operations / Supreme Headquarters Allied Powers Europe

***NATO ACO METOC Support to NATO Operations***

Abstract:

Not releasable.

References:

Not releasable.

## 3.16 Jan HOFFMANN, "Questions and ideas out of and for Operations Assessment in a JTFHQ (L)", 1GNC, DEU



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***LtCol (GS) Dr. Jan HOFFMANN***

1GNC - 1st German-Netherlands Corps, J10/Operations Assessment

***Questions and ideas out of and for Operations Assessment in a JTFHQ (L)***

Abstract:

NATO's decision making process (DMP) is based on operations assessment (OPSA) IOT enable a more informed decision based on modern IT tools as well as alternative analysis techniques. This includes risk assessment as an integral part and necessity for C2 in operations.

1st German-Netherlands Corps (1GNC) – a land HQ in NFS – finalized its evaluation process as a JTFHQ (L) with the exercise TRIDENT JAGUAR 2017. Out of the experience questions but also ideas developed how to execute and improve OPSA w/r to

- Data collection & analysis

- Risk assessment as well as other factors in the OPLAN (e.g. assumptions or centre of gravity)

- Support in war gaming

Development of own tools in support of TOPFAS Campaign Assessment Tools (CAT)The presentation will link practical examples from the joint level to thoughts and ideas about gaps and needs w/r to qualification of personnel as well as IT-applications.

References:

[1] NATO Comprehensive Operations Planning Directive, 2013.

[2] NATO Operations Assessment Handbook, 2015.

[3] NATO Force Structure Joint Task Force HQ Handbook, 2016.

[4] Vego, Milan N.: Joint Operational Warfare – Theory and Practice, 2007.

[5] Das Deutsche Reich und der Zweite Weltkrieg, Der global Krieg, Vol. 6, 1990.

## 3.17 Aren HUNTER, Tania RANDALL, and Mark HAZEN, "*Course of Action Testbed (COAT) for Mission Planning*", DRDC, CAN



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Dr. Aren HUNTER, Ms. Tania RANDALL, and Mr. Mark HAZEN***

DRDC - Defence Research and Development Canada, CAN

***Course of Action Testbed (COAT) for Mission Planning***

Abstract:

Defence Research and Development Canada (DRDC, [1]) Atlantic is developing a Course of Action Testbed (COA-T) to aid at-sea mission planning teams, including naval task groups (NTGs), during the 24-72 hour planning cycle. To date, a number of data collection activities including task analyses, subject matter expert (SME) tabletop exercises, and human-in-the-loop experiments have been completed. The intent of these investigations was to understand the decision-making processes and information requirements of Naval planning teams, including the practical implementation of the Operational Planning Process. The results of these experiments were used to inform the design and development of decision support features in COA-T. This talk will summarize the team's completed work, including a brief discussion of the COA-T interface, context-relevant information factors being implemented to support COA development, planning-relevant mission criteria, and optimization algorithms. Future experimental plans will also be discussed.

References:

[1] http://www.drdc-rddc.gc.ca/

## 3.18 Clément IPHAR, Aldo NAPOLI, and Cyril RAY, "A System for Alert Triggering based on Automatic Identification System (AIS) Data Integrity Analysis", CRC MINES ParisTech & IRENav, FRA



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Mr. Clément IPHAR, Dr. Aldo NAPOLI, and Dr. Cyril RAY***

CRC – MINES ParisTech – Centre for Research on Risks and Crises / IRENav - French Naval Academy Research Institute, FRA

***A System for Alert Triggering based on Automatic Identification System (AIS) Data Integrity Analysis***

Abstract:

It has been demonstrated that the AIS initially set for security purposes, suffers from errors, falsifications and spoofing cases ([1] and [2]).

A system for alert triggering based on AIS messages treatment and behavioural analysis has been set. This system is made of several modules [3], one for data storage, one for data analysis (with archived data or on-the-fly) and another one for scenario assessment leading to risk evaluation and alert triggering.

We propose a method taking into consideration the complex structure of AIS messages[4], in which each message data quality and integrity is assessed with respect to AIS specifications, other messages (either sent by the same vessel or not) and some environmental data (such as fleet registers).

A set of selected scenarios has been implemented (such as identity theft, whereabouts spoofing, vessel disappearance) and is assessed subsequently. Those scenarios are linked to risks of maritime navigation such as collisions, illegal trade or terrorism, the analysis of which, in conjunction with the vessel environment, leading to the assignment of levels of alert corresponding to the risks defined, suitable to be handed to relevant authorities as decision support information.

References:

[1] Ray C., Iphar C., Napoli A., Gallen R. and Bouju A., DeAIS project: Detection of AIS Spoofing and Resulting Risks. In: proceedings of OCEANS 2015, 18-21 May 2015;

[2] Balduzzi M., Pasta A. and Wilhoit K., A security evaluation of AIS automated identification system. In: proceedings of ACSAC 2014, 7-12 December 2014;

[3] Iphar C., Napoli A. and Ray C., Integrity Assessment of a Worldwide Maritime Tracking System for a Geospatial Risk Analysis at Sea. In: proceedings of the 20th AGILE Conference, 9-12 May 2017;

[4] Tunaley J.K.E., Utility of Various AIS Messages for Maritime Awareness. In: Proceedings of the 9th Advanced SAR Workshop. 15-18 October 2013.

## 3.19 Michel LILETTE, "Solutions for mission optimization in a complex environment. Latest generation of innovative and intuitive C2 and Sonobuoy Processing Systems", THALES, FRA



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

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NATO STO CMRE, La Spezia, Italy

***Cdr (R) FRA-N Michel LILETTE***

THALES - Underwater Systems (TUS) SAS & Systèmes Aéroportés (TAS) SAS representative

***Solutions for mission optimization in a complex environment. Latest generation of innovative and intuitive C2 and Sonobuoy Processing Systems***

Abstract:

For the past decades, the world maritime traffic has significantly increased while new threats emerged, leading to an ever more complex air-sea environment in which the detection of stealthy surface or undersea threats is getting difficult.

Development of higher performance sensors and intelligent C2 has proved to be crucial to maintain control over a complex environment.

Industry has developed an innovative and user-friendly mission system to address these new constraints. AMASCOS allows the operator to fully concentrate on his mission by decreasing his workload and improving his controlling of the environment via decision-making support tools. The operator therefore takes full advantage of new sensors, which are increasingly more performing.

Environment control is vital in Anti-Submarine Warfare (ASW).

A new generation of acoustic processing systems has been developed to detect constantly evolving threats. An innovative and user-friendly Human-Machine Interface (HMI) based on the AMASCOS C2 concept lightens the operator's workload, thus optimizing his analysis of acoustic detection within a complex tactical situation.

References:

None.

## 3.20 Alvaro LORENZO-LOPEZ, Alexander Brian PHILLIPS, Catherine HARRIS, "Oceanids C2. A Command and Control Infrastructure for the UK unmanned long-range fleet", NOC, GBR




*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***Mr. Alvaro LORENZO_LOPEZ, Dr. Alexander Brian PHILLIPS, Dr. Catherine HARRIS***

NOC – National Oceanography Centre, GBR

***Oceanids C2. A Command and Control Infrastructure for the UK unmanned long-range fleet***

Abstract:

As part of the Oceanids £10M NERC investment into Marine Autonomous Systems, we are developing a command, control and data UK National infrastructure (C2). This infrastructure will allow near real-time data access and remote operation of the NERC long-range fleet comprising gliders, surface vessels and AUVs. One of the main impediments to operating heterogeneous fleets of vehicles is the lack of consistency between vehicle manufacturers, for example in the release of interfaces enabling both humans and machines to interact with the assets.

The Oceanids C2 will develop a modular, server-based solution, allowing the seamless integration of different autonomous platforms, and releasing a series of standard APIs, facilitating the development of an advanced applications ecosystem to maximize the potential of the NERC long-range fleet.

This presentation will explain the envisioned system architecture and the potential user cases to be solved.

References:

None.

## 3.21 Tommy MIRVOLL, "*Future JISR possibilities*", NOBLE, NOR



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***Mr. Tommy MIRVOLL***

NOBLE - Norwegian battle lab and Experimentation, Norwegian Cyber Defense, NOR

***Future JISR possibilities***

Abstract:

Not releasable.

References:

Not releasable.

## 3.22 Konstantinos PELEKANAKIS, and Roberto PETROCCIA, "Underwater communications and networking in polar regions - environmental impact and performance tradeoffs", NATO STO CMRE



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***Dr. Konstantinos PELEKANAKIS, and Dr. Roberto PETROCCIA***

NATO STO CMRE – NATO Science and Technology Organization Centre for Maritime Research and Experimentation

***Underwater communications and networking in polar regions - environmental impact and performance tradeoffs***

Abstract:

Not releasable.

References:

Not releasable.

## 3.23 José A. RODRIGUEZ, Daniel GONZALEZ, Daniel PEREIRA, Vicente MACHADO, Jorge NAYA, and Hugo GARCIA, "*Challenges in Video Analytics for MISR*", GRADIANT, ESP




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***Dr. José A. RODRIGUEZ, Dr. Daniel GONZALEZ, Mr. Daniel PEREIRA, Mr. Vicente MACHADO, Mr. Jorge NAYA, and Mr. Hugo GARCIA***

GRADIANT – Galician Research and Development Center in Advanced Telecommunications, ESP

***Challenges in Video Analytics for MISR***

Abstract:

Electro Optical (EO) sensors have been at the core of Maritime Intelligence Surveillance and Reconnaissance missions (MISR) for decades. Current sensor technology offers alternatives not only in the visible (VIS) and near infrared (NIR) bands of the optical spectrum, but in others such as long wave, medium wave and short wave infrared (LWIR, MWIR, SWIR). The use and combination of the information in these bands allows for EO systems to be applied in very diverse scenarios and weather conditions. Thus, EO systems are keys in supporting decision making for MISR.

Despite all this, the use of EO systems for MISR still involves a considerable amount of human supervision. In order to fully exploit the potential of EO sensors, and build systems that minimize the need for manual intervention while helping build rich and complete situational awareness, progress in intelligent video analysis is required. Thus, new techniques are needed that adapt to advances in sensor technology, and that embrace new paradigms of image processing and machine learning, such as parallel processing and deep learning.

In this paper, some of the most relevant challenges in intelligent video analysis are introduced, and preliminary results for these challenges are presented on different MISR scenarios.

References:

None.

## 3.24 Christopher STRODE, and Manlio ODDONE, "Demonstrating real time acoustic predictions during exercise Dynamic Mongoose 2017", NATO STO CMRE



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NATO STO CMRE, La Spezia, Italy

***Mr. Christopher STRODE, and Mr. Manlio ODDONE***

NATO STO CMRE – NATO Science and Technology Organization Centre for Maritime Research and Experimentation

***Demonstrating real time acoustic predictions during exercise Dynamic Mongoose 2017***

Abstract:

Fully range dependent acoustic predictions provide enhanced situational awareness for sonar operators and planners during ASW exercises. However the data and tools typically required to perform such calculations can be cumbersome and difficult to operate. Furthermore, within a typical task group, different National tools will be applied and different environmental assessments ingested. As a result the ASW commander will not have a consistent picture of the sonar performance of his platforms. For these reasons STO CMRE is developing an acoustic prediction web service to provide operators on board multiple platforms with predictions using a central acoustic engine and a single range dependent environmental input. The web service approach provides sonar coverage plots and range versus depth plots by simply dragging platforms onto a map. All interaction is handled through a simple web browser without requiring the installation of any software. This presentation provides details of the deployment of the prototype web service during the Dynamic Mongoose ASW exercise where it was used on-board the flagship. We show examples of added value where range dependent predictions helped the operators optimize both sensor depth and platform position. Actual submarine detections were observed following advice from the web service prototype.

References:

None.

## 3.25 Raúl VICEN-BUENO, Giampaolo CIMINO, and Daniele CECCHI, "GliderC2 – Interoperable Unmanned Underwater Glider Command & Control capability at CMRE: Tested in NATO Exercises", NATO STO CMRE



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**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Dr. Raúl VICEN-BUENO, Mr. Giampaolo CIMINO, and Dr. Daniele CECCHI***

NATO STO CMRE – NATO Science and Technology Organization Centre for Maritime Research and Experimentation

***GliderC2 – Interoperable Unmanned Underwater Glider Command & Control capability at CMRE: Tested in NATO Exercises***

Abstract:

NATO STO CMRE demonstrated in 2016 and 2017 NATO exercises part of its underwater glider command and control capability (NATO-CMRE-GliderC2). This capability provided the information acquired during long-term deployments of underwater gliders to NATO and national capabilities. This work was done in coordination with the CMRE-lead sea-trials LOGMEC16 (Long-Range Glider Missions for Environmental Characterization 2016) [1] and NREP17 (Nordic Recognized Environmental Picture 2017) [2], in which several nations participated. The GliderC2 capability was tested and demonstrated during the NATO Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) on 2016 and 2017. This is an incremental step from previous years participations [3]. During CWIX16, the GliderC2 capability provided live underwater glider positions and tracks (planned missions), as well as oceanographic observations and forecasts [4] to contribute to different NATO concepts, such as Recognized Maritime Picture (RMP), Recognized Environmental Picture (REP), Rapid Environmental Assessment (REA) and Common Operational Picture (COP). For doing all this, the GliderC2 capability implements highly interoperable standards used in NATO and by its nations. This information was remotely provided in near real-time and in an automatic and reliable way (no human interaction) from underwater gliders operated in Italian waters on 2016 and in Southern Iceland waters on 2017 to NATO and national capabilities deployed at the NATO Joint Force Training Centre (JFTC) in Bydgoszcz, Poland. Information was successfully provided, used and displayed 2,000 km far from gliders in tactical and operational scenarios. During CWIX17 [5], in addition to this, CMRE allowed final users to command and control underwater gliders (Iceland water) from remote sites (JFTC, Poland).

References:

[1] R. Onken, Long-Range Glider Missions for Environmental Characterization 2016 (LOGMEC16), Proc. Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2016 Conference, 26-28 June 2016, NATO STO CMRE, La Spezia (Italy).

[2] A. Russo, High Latitudes environmental characterization challenges and the scientific sea trial NREP17, Proc. Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference, 2-4 Oct 2016, NATO STO CMRE, La Spezia (Italy).

[3] R. Vicen-Bueno, and F.A. Bourque, Participation of EKOE capabilities in the NATO Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) 2015, NATO STO CMRE Formal Report (CMRE-FR-2015-014), Vol. 2015, No. 014, pp. 1-255, 2015, NATO STO CMRE.

[4] R. Vicen-Bueno, C. Strode, M. Oddone, A. Berni, A. Cignoni, D. Merani, G. Cimino, D. Cecchi, J. Soto, and M. Fiala, NATO Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) 2016 Exercise Plan for EKOE and CASW capabilities, NATO STO CMRE Formal Report (CMRE-MR-2016-002), Vol. 2016, No. 2, pp. 1-64, 2016, NATO STO CMRE.

[5] R. Vicen-Bueno, G. Cimino, D. Cecchi, D. Merani, J. Soto, and A. Berni, NATO Coalition Warrior Interoperability exploration, experimentation, examination, exercise (CWIX) 2017: exercise plan for the NATO-CMRE-GliderC2 capability participation, NATO STO CMRE Formal Report (CMRE-FR-2017-001), Vol. 2017, No. 1, pp. 1-66, 2017, NATO STO CMRE.

## 3.26 Volker VOSS, "Using and adapting the in-house developed, platform independent Combat Management System "MESE" for ACINT and ASW missions", MUKdo, DEU



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

DeSRA 2017 Conference, 2-4 October 2017
NATO STO CMRE, La Spezia, Italy

***LtCdr DEU-N Volker VOSS***

MUKdo – NavalSupportCmd – German Naval Support Command, DEU

***Using and adapting the in-house developed, platform independent Combat Management System "MESE" for ACINT and ASW missions***

Abstract:

The MESE C5ISTAR Combat Management System is a product of the German Naval Support Command located in Wilhelmshaven. It has currently a prototype status but is already in heavy operational use and intensive testing especially in ACINT and ASW operations. It's fully implemented in Java/Java Real Time, highly modular and offering a framework for easy creating also modular, flexible, ergonomic plug-in-fight human-machine-interfaces. On the conference we would like to present the cooperation of several MESE tools for example in partly automatically writing tactical reports and the recording and evaluation of operations and maneuvers. At least we give a short summary of the ad-hoc integration of the Glider on the CWIX2017.

References:

None.

## 3.27 Russell WYNN, "Physical and human factors and their influence on marine robotic fleet operations: lessons learned from four years of MASSMO missions", NOC, GBR



*Decision Support and Risk Assessment for Operational Effectiveness 2017 Conference*

**DeSRA 2017 Conference, 2-4 October 2017**
NATO STO CMRE, La Spezia, Italy

***Prof. Russell WYNN***

NOC – National Oceanography Centre, GBR

***Physical and human factors and their influence on marine robotic fleet operations: lessons learned from four years of MASSMO missions***

Abstract:

Since 2014, the UK Defence Science and Technology Laboratory (Dstl) have tasked the National Oceanography Centre (NOC) with the co-ordination of annual marine robotics demonstrator missions, called Marine Autonomous Systems in Support of Marine Observations (MASSMO) [1, 2, 3]. The aim has been to test and demonstrate new robotic platforms, sensors and C2 systems in open-ocean environments, and develop new concepts-of-operation for multi-vehicle fleets. The missions have grown in scale and complexity each year, with the summer 2017 mission seeing a fleet of 11 surface and submarine vehicles operating up to 180 km offshore of northwest UK in waters up to 1000 m deep for two weeks, in partnership with NATO-CMRE and NRV Alliance. In 2016, a similar MASSMO fleet made a significant contribution to the GEOINT theme of the Royal Navy's Unmanned Warrior. This presentation will describe developments in the MASSMO organizational structure, including the mission portal where vehicle positions and real-time environmental data can be viewed together with data layers capturing physical features (e.g. satellite observations and ocean models) and human activity (e.g. AIS shipping). The presentation will conclude with a brief outline of planned MASSMO missions to Arctic waters in 2018-20.

References:

[1] http://www.bbc.co.uk/news/science-environment-29464273

[2] http://www.bbc.co.uk/news/uk-wales-south-west-wales-36342468

[3] http://www.bbc.co.uk/news/uk-scotland-highlands-islands-37822097

# References

[1] *Decision Support and Risk Assessment for Asset Planning (DeSRAAP) 2014 Workshop* - official website: http://www.cmre.nato.int/desraap-2014

[2] R. Vicen-Bueno, "*2014 Workshop on Decision Support and Risk Assessment for Asset Planning (DeSRAAP 2014)*", NATO STO CMRE Memorandum Report CMRE-MR-2015-015, 2015.

[3] *Decision Support and Risk Assessment for Asset Planning (DeSRAAP) 2015 Workshop* - official website: http://www.cmre.nato.int/desraap-2015

[4] *Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2016 Conference* - official website: http://www.cmre.nato.int/desra-2016-conference

[5] R. Vicen-Bueno, E. Coelho, F.A. Bourque, Proceedings of the NATO DeSRA 2016 Conference, CMRE-CP-2016-001, 2016.

[6] *Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference* - official website: http://www.cmre.nato.int/desra-2017-conference

# Document Data Sheet

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**Title**

Conference Proceedings of the Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference


**Abstract**

The Decision Support and Risk Assessment for Operational Effectiveness (DeSRA) 2017 Conference Proceedings contain the peer-reviewed abstracts accepted for this conference. The DeSRA 2017 Conference took place at the NATO STO CMRE facilities in La Spezia, Italy, on 2-4 October 2017. Its overarching objective was to bring together personnel from the military, civilian, industry and research communities to discuss and identify environmental risks, planning shortfalls and ways-ahead to assist decision makers and improve operational effectiveness. These Conference Proceedings contain a total of 27 abstracts covering all the topics of the conference, such as: Recognized Environmental Picture (REP) and Risk Assessment; Environmental Information Flow for Decision Support and Command and Control (C2); Maritime Intelligence, Surveillance and Reconnaissance (MISR); and Operational Experimentation (OPEX) Opportunities.

Researchers and industry were exposed to real challenges faced in operations from the military and civilian organizations/institutions participating. Besides the speakers of the 27 Abstracts published in these proceedings, additional military and civilian personnel attended the DeSRA 2017 Conference to learn about state-of-the-art techniques and systems on the topics of the conference. They also had the opportunity to make contributions and influence the development of these techniques and systems. A total of 2 NATO bodies: ACO/SHAPE and STO CMRE, and 20 institutions/organizations from 13 NATO and Partner nations: 1 CAN, 2 DEU, 1 DNK, 2 ESP, 4 FRA, 2 GBR, 4 ITA, 1 NLD, 1 NOR, 1 NZL, 1 USA, participated in this NATO STO CMRE-lead conference. Details of the contributions made by the participants are incorporated in the Abstracts provided in these DeSRA 2017 Conference Proceedings.



**Keywords**

DeSRA; Decision support; Risk assessment; Operational effectiveness; Conference; Proceedings; REP; NATO; Command and Control; ISR; Intelligence; Surveillance, Reconnaissance; Interoperability; Experimentation



**Issuing Organization**

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